WESTOVER FBP PROBE MICROSCOPE & HD3 DISPLAY

Handheld video probe microscope and display for fiber inspection

USER MANUAL

ZP-PKG-0346
REV 3

JDSU

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PATENTS

RibbonDrive Tips: US Patent No. 6,751,017 / 6,879,439

CleanBlast: US Patent No. 7,232.262

TESTED EQUIPMENT

All pre-qualification tests were performed internally at JDSU, while all final tests were performed externally at an independent, accredited laboratory. This external testing guarantees the unerring objectivity and authoritative compliance of all test results. JDSU's Commerce and Government Entities (CAGE) code under the North Atlantic Treaty Organization (NATO) is 0L8C3.

FCC INFORMATION

Electronic test equipment is exempt from Part 15 compliance (FCC) in the United States.

EUROPEAN UNION

Electronic test equipment is subject to the EMC Directive in the European Union. The EN61326 standard prescribes both emission and immunity requirements for laboratory, measurement, and control equipment. This unit has been tested and found to comply with the limits for a Class A digital device.

INDEPENDENT LABORATORY TESTING

This unit has undergone extensive testing according to the European Union Directive and Standards.

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JDSU FIBER INSPECTION SOLUTIONS

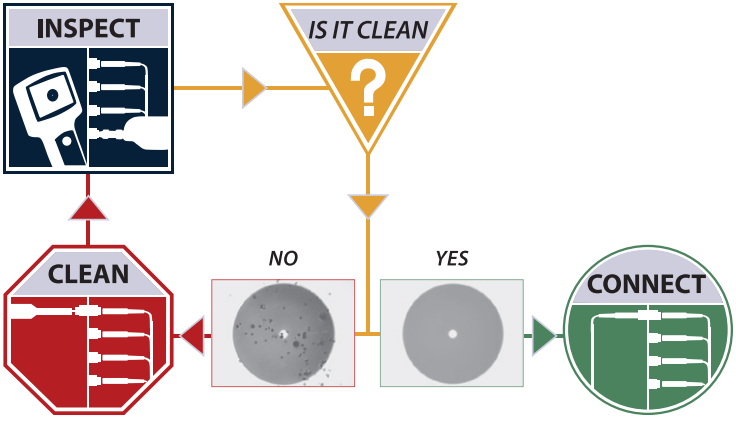
1

INSPECT BEFORE YOU CONNECT℠

CONTAMINATION IS THE #1 SOURCE OF TROUBLESHOOTING in optical networks. A single particle mated into the core of a fiber can cause significant back reflection, insertion loss, and equipment damage. Visual inspection is the only way to determine if fiber connectors are truly clean before mating them.

SIMPLE SOLUTION

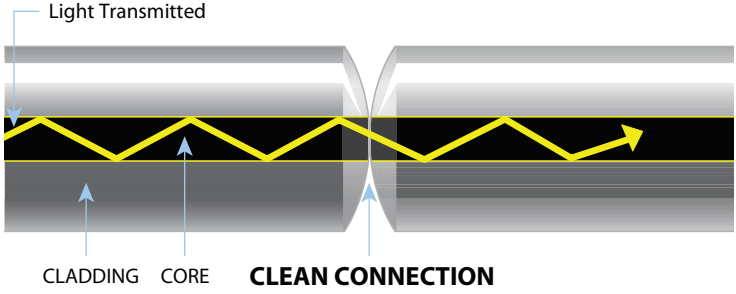
By implementing a ***SIMPLE yet IMPORTANT*** process of proactive visual inspection and cleaning, you can prevent poor signal performance and equipment damage.



GOOD FIBER CONNECTION

There are **3 BASIC PRINCIPLES** that are critical to achieving an efficient fiber optic connection:

1. **PERFECT CORE ALIGNMENT**
2. **PHYSICAL CONTACT**
3. **PRISTINE CONNECTOR INTERFACE**



Today's connector design and production techniques have eliminated most of the challenges to achieving **CORE ALIGNMENT** and **PHYSICAL CONTACT.** What remains challenging is maintaining a **PRISTINE END FACE.**

JDSU FIBER INSPECTION & CLEANING SOLUTIONS

The JDSU video fiber inspection probe and handheld display system is used to quickly and easily inspect connector end faces, which ultimately minimizes loss and optimizes test conditions. WESTOVER FBP series video probes, available in digital or analog and single or dual-magnification (200/400X) models are high-performance, handheld microscopes designed for inspecting both "female" (bulkhead) and "male" (patch cord) connectors, as well as other optical devices. The probe microscope can also be combined with a USB converter module to inspect connectors via compatible test platforms and PC/laptop. Our versatile systems offer a wide range of configurable solutions that can meet the demands of any application.

BENEFITS OF PROACTIVE INSPECTION

- REDUCE NETWORK DOWNTIME
- REDUCE TROUBLESHOOTING
- OPTIMIZE SIGNAL PERFORMANCE
- PREVENT NETWORK DAMAGE

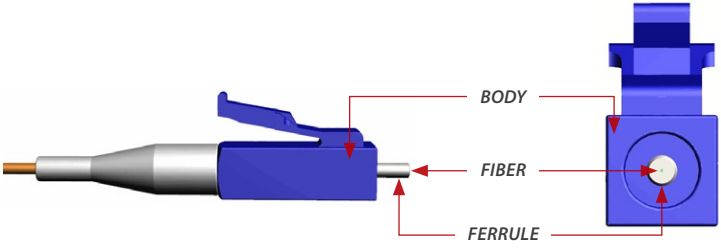
FIBER OPTIC CONNECTORS

2

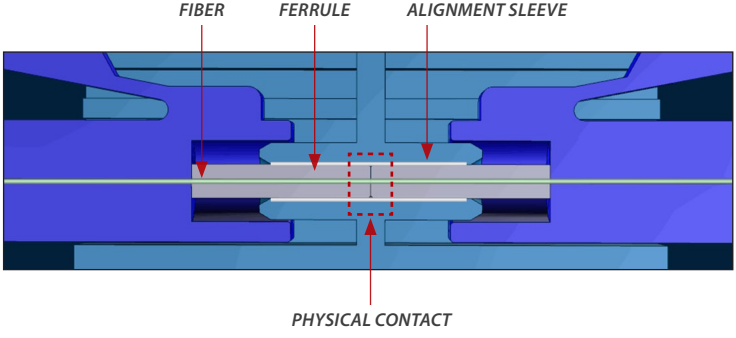
KEY TERMS & CONCEPTS

Fiber connectors enable fiber-to-fiber mating by aligning the two optical fibers. Fiber connectors come in various types and have different characteristics for use in different applications. The main components of a fiber connector are detailed below:

FIBER CONNECTOR
(SIMPLEX)



FIBER CONNECTION
(SIMPLEX)



BODY Houses the ferrule that secures the fiber in place; utilizes a latch and key mechanism that aligns the fiber and prevents the rotation of ferrules of two mated connectors.

FERRULE Thin cylinder where the fiber is mounted and acts as the fiber alignment mechanism; the end of the fiber is located at the end of the ferrule.

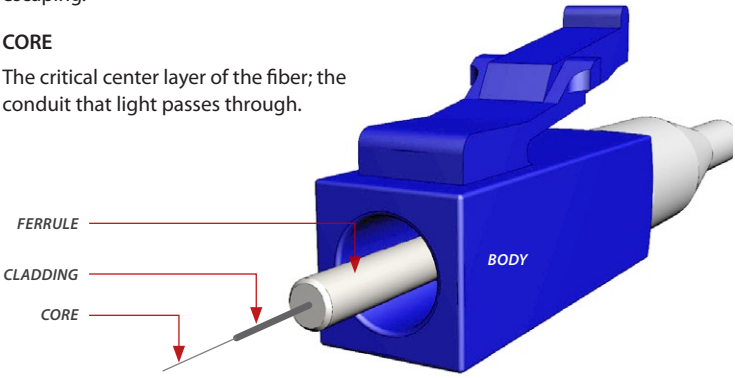
FIBER

CLADDING

Glass layer surrounding the core, which prevents the signal in the core from escaping.

CORE

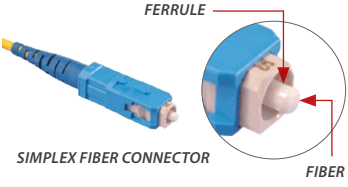
The critical center layer of the fiber; the conduit that light passes through.



SIMPLEX & MULTI-FIBER CONNECTORS

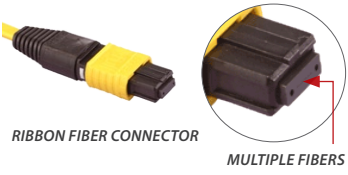
SIMPLEX FIBER CONNECTOR

A simplex fiber connector contains a single fiber located in the center of the ferrule. Common types include SC, LC, FC and ST.



MULTI-FIBER CONNECTOR

A multi-fiber/ribbon fiber connector contains multiple linear fibers (4, 8, 12, 24, 48 or 72) in a single connector to provide high-density connectivity. The most common configuration is MPO (also called the MTP®).



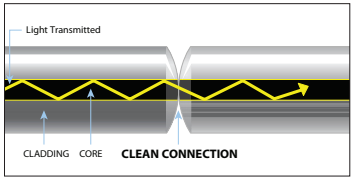
CONTAMINATION

DIRT IS EVERYWHERE, and a typical dust particle (2–15µm in diameter) can significantly affect signal performance and cause permanent damage to the fiber end face. Most field test failures can be attributed to dirty connectors, and most of them are not inspected until the problem is detected, AFTER permanent damage has already occurred.

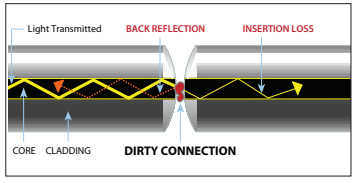
If dirt particles get on the core surface the light becomes blocked, creating unacceptable insertion loss and back-reflection. Furthermore, those particles can permanently damage the glass interface, digging into the glass and leaving pits that create further back-reflection if mated. Also, large particles of dirt on the cladding layer and/or the ferrule can introduce a barrier that prevents physical contact and creates an air gap between the fibers. To further complicate matters, loose particles have a tendency to migrate.

Scratches are typically created during polishing, cleaning or mishandling fiber connectors. Scratches that touch the core are problematic because they create back reflection.

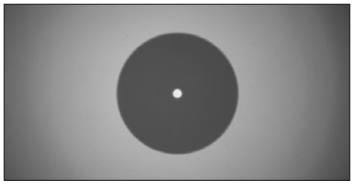
CLEAN CONNECTION



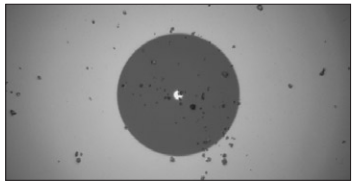
DIRTY CONNECTION



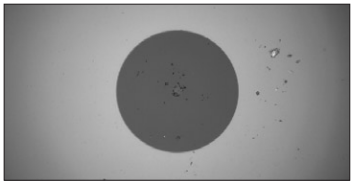
CLEAN FIBER



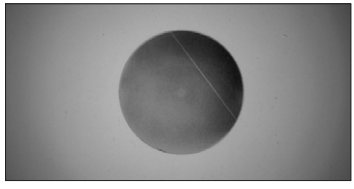
DIRT / CONTAMINATION



PITS / CHIPS



SCRATCH

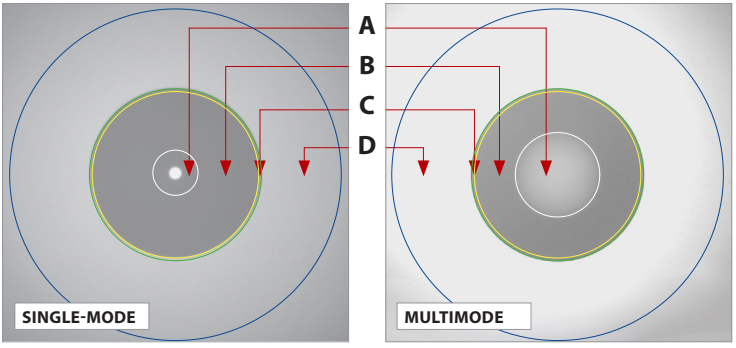


ZONES

ZONES are a series of concentric circles that identify areas of interest on the connector end face. The inner-most zones are more sensitive to contamination than the outer zones.

ZONES OVERLAYS

A. CORE
B. CLADDING
C. ADHESIVE/EPOXY
D. CONTACT/FERRULE



ACCEPTANCE CRITERIA

ACCEPTANCE CRITERIA are a series of failure thresholds that define contamination limits for each zone.

The tables below list the **ACCEPTANCE CRITERIA** standardized by the **International Electrotechnical Commission (IEC)** for single-mode and multimode connectors as documented in *IEC 61300-3-35 Ed. 1.0*.

SINGLE-MODE

ZONE NAME (Diameter)	**SCRATCHES**	**DEFECTS**
A. CORE Zone (0–25µm)	none	none
B. CLADDING Zone (25–120µm)	no limit <= 3µm none > 3µm	no limit < 2µm 5 from 2–5µm none > 5µm
C. ADHESIVE Zone (120–130µm)	no limit	no limit
D. CONTACT Zone (130–250µm)	no limit	none => 10µm

MULTIMODE

ZONE NAME (Diameter)	**SCRATCHES**	**DEFECTS**
A. CORE Zone (0–65µm)	no limit <= 5µm 0 > 5µm	4 <= 5µm none > 5µm
B. CLADDING Zone (65–120µm)	no limit <= 5µm 0 > 5µm	no limit < 2µm 5 from 2–5µm none > 5µm
C. ADHESIVE Zone (120–130µm)	no limit	no limit
D. CONTACT Zone (130–250µm)	no limit	none => 10µm

WESTOVER FBP PROBE MICROSCOPE

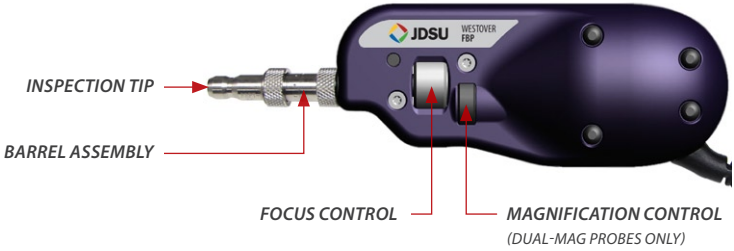
3

INTRODUCTION

JDSU's **WESTOVER FBP Series Probe Microscopes** are portable video microscopes used to inspect fiber optic connectivity. While most fiber microscopes are limited to inspecting "male" connectors, JDSU's WESTOVER FBP Probe is designed to inspect both simplex and multi-fiber (ribbon) types of both "male" and "female" connectors as well as optical devices, such as transceivers. The probe is specially designed to fit and operate comfortably and easily in-hand, allowing the user to inspect hard-to-reach connectors that are installed on the backside of patch panels or inside hardware devices. This eliminates the need to disassemble hardware devices prior to inspection.

CONTROLS

The basic design of the **WESTOVER FBP** probe microscope incorporates an imaging system, integrated light source, video camera, focus mechanism and magnification control. The probe is fully assembled and is powered by the display device. The only assembly required by the user is the connection to the display device and installation of the appropriate barrel assembly and/or the inspection tip. The FBP analog probe is equipped with a 4-pin circular Hirose™ connector with notch-keys which allows for a secure and firm latch-lock connection to the display device.



FOCUS CONTROL

The **FOCUS CONTROL** on the probe allows the user to adjust focus manually of the live fiber end face image on the display.

MAGNIFICATION CONTROL

The **MAGNIFICATION CONTROL** *(available only on dual-magnification probes)* allows the user to switch between LOW and HIGH magnifications of the fiber end face image.

SPECIFICATIONS

Dimensions	14.0cm x 4.6cm x 4.4cm
Weight	180g
Cord Length	240cm
Connector	4-pin Hirose™ male
Camera Type	1/3" CMOS Sensor
Video Output	NTSC or PAL
Light Source	Blue LED, 100,000+ hour life
Lighting Technique	Coaxial
Power Source	from the display device or USB module

ANALOG PROBE MODELS

FBP-P1	Analog, Single (LOW, 200X) Mag, NTSC
FBP-P1-400	Analog, Single (HIGH, 400X) Mag, NTSC
FBP-P5	Analog, Dual (LOW & HIGH, 200/400X) Mag, NTSC

FBPT INSPECTION TIPS & ADAPTERS

4

INTRODUCTION

JDSU's comprehensive selection of over 250 precision, stainless-steel fiber inspection tips and adapters will inspect every connector and application. Our unique optics architecture and design provide true versatility and adaptability, and designed and engineered for consistent and accurate inspection. These connector-specific and universal inspection tips are interchangeable, which allow the probe to interface with different types of fiber connectors.

BARREL ASSEMBLIES

The ***BARREL ASSEMBLY*** houses the objective lens and works in conjunction with a number of tips.

NOTE: *Certain tips are equipped with integrated optics and do not require a barrel assembly (e.g., Long Reach Tips [FBPT-LC-L], Angled Tips [FBPT-SC-A6]).*

FBPP-BAP1

FBPP-BAP2

FBPP-BAP3

FBPT-SC *(BULKHEAD)*

STANDARD TIPS (BULKHEAD & PATCH CORD)

Standard bulkhead tips allow the user to inspect the fiber end-face on the "female" side of the bulkhead *(e.g., inside hardware devices or on the back side of patch panels)*.

FBPT-U25M *(PATCH CORD)*

Standard patch cord tips allow inspection of "male" ends of a fiber connection *(e.g., patch cords, pigtails, etc.)*. "Universal" tips include the **FBPT-U25M**, compatible with 2.5mm ferrules *(e.g., FC, SC, ST)* and the **FBPT-U12M**, used to inspect 1.25mm ferrules *(e.g., LC, MU)*.

FBPT-LC-L

LONG REACH TIPS

Long reach tips have a 1/2" longer reach than standard tips, and allow the user to inspect the fiber end-faces in tight, hard-to-reach spaces.

FBPT-SC-APC

APC TIPS

APC tips are designed with an angle that complements the end face of an APC polish fiber connector. This allows the entire fiber image to stay in focus during inspection.

FBPT-SC-A6

ANGLED TIPS

Angled tips, identified by "A6," are angled 60° to allow easy maneuvering and inspection of hard-to-reach locations such as transceivers on a printed circuit board (PCB) or bulkheads located in tight spaces.

FBPT-MTPA

RIBBONDRIVE™ TIPS

JDSU's patented RibbonDrive™ tips are specialty tips that allow inspection of high-density, multifiber array connectors that are mounted within a bulkhead adapter. Each tip mates securely with connectors using a precision-keyed mating adapter interface. The patented "panning knob" allows the user to view each fiber individually in the linear array.

FBPT-A801-2-001-R

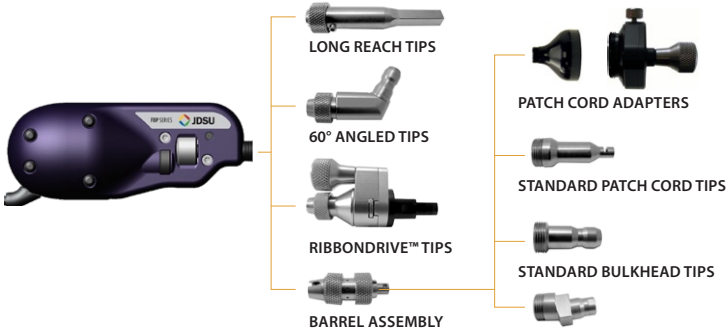
ALIGNMENT GUIDES

Alignment guides enable the inspection of various military & aerospace connectors that use a plug & receptacle design. In addition to providing an alignment channel for sockets, these alignment guides work in conjunction with a barrel assembly to prevent the pins from breaking.

FMA ADAPTERS

FMA Adapters provide optimized inspection for "male" connector ends and are ideal for inspecting patch cords with multi-fiber ribbon and APC polish connectors. FMA adapters can be utilized by a probe microscope with a universal flare adapter **(FBPT-UFMA).**

FBPT TIP INSTALLATION GUIDE



JDSU offers a comprehensive selection of over 250 tips and adapters that will to inspect every connector and application.

FBPT STANDARD INSPECTION TIPS *(common tips shown)*

CONNECTOR TYPE	INSPECTION TIP	APPLICATION	DESCRIPTION
SC/UPC	FBPT-SC		Inspect SC/UPC connectors through a bulkhead.
	FBPT-U25M		Inspect 2.5mm UPC patch cord connectors.
SC/APC	FBPT-SC-APC		Inspect SC/APC connectors through a bulkhead.
	FBPT-U25MA		Inspect 2.5mm APC patch cord connectors.
LC/UPC	FBPT-LC		Inspect LC/UPC connectors through a bulkhead.
	FBPT-U12M		Inspect 1.25mm UPC patch cord connectors.
	FBPT-LC-L		Inspect LC/UPC connectors through a bulkhead with 1/2" longer reach.
LC/APC	FBPT-LC-APC		Inspect LC/APC connectors through a bulkhead.
	FBPT-U12MA-SF		Inspect 1.25mm APC patch cord connectors.

FBPT STANDARD INSPECTION TIPS

CONNECTOR TYPE	INSPECTION TIP	APPLICATION	DESCRIPTION
ST/ UPC	FBPT-ST		Inspect **ST/UPC connectors through a bulkhead.**
	FBPT-ST-A6		Inspect **ST/UPC connectors through a bulkhead at a 60° angle.**
FC/ UPC	FBPT-FC		Inspect **FC/UPC connectors through a bulkhead.**
FC/ APC	FBPT-FC-APC		Inspect **FC/APC connectors through a bulkhead.**
E2000/ APC	FBPT-E2000		Inspect **E2000/APC connectors through a bulkhead.**

FBPT MULTI-FIBER RIBBONDRIVE™ INSPECTION TIPS

CONNECTOR TYPE	INSPECTION TIP	APPLICATION	DESCRIPTION
MTP®/UPC	FBPT-MTP-A6		Inspect **MTP®/UPC connectors through a bulkhead at a 60° angle.**
MTP®/APC	FBPT-MTPA-L		Inspect **MTP®/APC connectors through a bulkhead (long reach).**
MTP® Patch Cords	FMA-MTPA & FBPT-UFMA		Inspect **MTP®/UPC or APC patch cords** *(MTP®/APC inspection shown).*
	FCLT-MTP-MA		Inspect **MTP®/UPC or APC patch cords** *(MTP®/APC inspection shown).*

WESTOVER HD3 DISPLAY

5

INTRODUCTION

The **WESTOVER HD3 Display** combines performance and value in a small form-factor device. It is designed for ultimate portability and incorporates features that enable comfort and efficiency. It features a 1.8" TFT LCD screen and an innovative GripSwitch™ that saves battery life by providing instant-ON functionality when both sides are pressed and turning OFF when released. A continuous-ON feature is also available for hands-free operation. With its durable design and ruggedized enclosure, the HD3 ensures excellent performance and portability in real-life field applications.

HD3 FEATURES

- 1.8″ TFT LCD display
- Ruggedized, drop-tested enclosure
- Power-saving GripSwitch™ designed for comfort and efficiency; provides instant-ON when gripped in-hand and turns power OFF to save battery life when released
- Built-in rechargeable NiMH (nickel metal hydride) battery pack
- 3-hour run time on continuous-ON mode, dramatically longer run time when utilizing the GripSwitch™ mode
- Low battery warning LED (when lit, remaining battery life will equal approximately 30 minutes)
- AC adapter (power supply 100–240VAC/12VDC) for alternate power source and for charging NiMH battery

CONTROLS

PROBE INPUT

4-pin FBP Probe input for stand-alone display

AC POWER/CHARGER INPUT

alternative AC power and battery charger input

LOW BATTERY INDICATOR

when lit, remaining battery life = 30 minutes

1.8″ TFT LCD SCREEN

GRIPSWITCH™

press both sides to turn power ON and release to turn power OFF

ACCESSORY CONNECTION

POWER MODE SELECTOR

- *ON Mode*
  for continuous ON
- *GripSwitch™ Mode*
  designed to save battery life
- *OFF/CHARGE Mode*
  to turn power OFF or to CHARGE battery

HEX SCREW

remove to access battery compartment

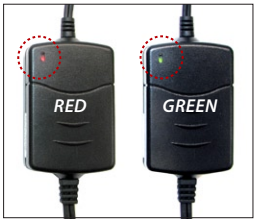
SPECIFICATIONS

Dimensions	10.0cm x 7.2cm x 4.3cm
Weight	230g with FBP probe
Video Display	1.8″ TFT LCD
Power Modes	• **ON** (continuous ON) • **GripSwitch™** (power saving mode) • **OFF/CHARGE**
Connectors	4-pin Hirose™ for FBP Probes or hardwired FBP or FBE probe
Power Source	Built-in rechargeable NiMH (nickel metal hydride), 800mAH battery or AC adapter (100-200VAC/12VDC)
Run Time	• ~3 hours continuous ON • Extended run time with use of GripSwitch™

CHARGING THE BATTERY

WARNING: *Use ONLY the AC adapter/charger provided to power the display and charge the battery.*

IMPORTANT: *Charge the battery for ~4 hours before using the battery power for the first time.*



1. Switch the power mode switch to the OFF/CHARGE position.
2. Connect the AC adapter/charger to the display and plug into wall socket.
3. The LED on the AC adapter/charger will illuminate **RED WHEN CHARGING** and **GREEN WHEN COMPLETE.**

CHANGING THE BATTERY

1. Unscrew the hex screw on the battery compartment with the hex key (included).
2. Disconnect and remove the battery.
3. Connect and install the new battery, running the wires *around* the battery.
4. Reattach and secure the battery compartment with the hex screw.

POWER MODES

ON MODE

Continuous ON mode

When the battery is fully charged, the display will stay on for approximately 3 continuous hours.

GRIPSWITCH™ MODE

Battery conserving mode

Press and release the GripSwitch™ feature on both sides of the display to turn the display ON and OFF, respectively.

OFF/CHARGE MODE

OFF or battery CHARGE mode

Switch to OFF/CHARGE mode to turn the display OFF or to recharge the internal battery using the AC adapter (included).

***NOTE:** The power mode switch must be in the OFF/CHARGE position for the battery to charge.*

HANGING ACCESSORY

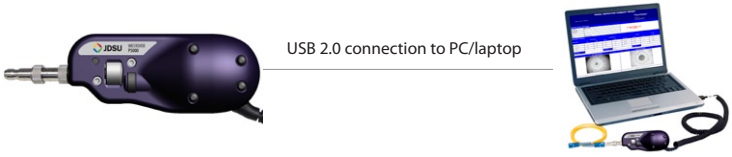
Use the hex tool to tighten the hex screw on the accessory and secure onto the back of the HD3 display.

The HD3 Display features a hanging accessory for hands-free operation. It utilizes a hook that allows the unit to be hung and positioned onto a specified location. The accessory is mounted onto the back of the display with a hex tool *(included)*.

APPENDIX A: JDSU VIDEO PROBE INSPECTION SYSTEMS

DIGITAL VIDEO PROBE

JDSU's **WESTOVER P5000** digital probe microscope connects directly to PC/laptops via a USB 2.0 connection, and operates with **FIBERCHEK2™**, an advanced software that determines the acceptability of optical fiber end faces through advanced automated inspection and analysis.



ANALOG VIDEO PROBE

JDSU's **WESTOVER FBP** analog probe microscopes connect directly to **WESTOVER HD DISPLAYS** *(HD1, HD2 or HD3)* or to a PC/laptop or JDSU test platform *(T-BERD/MTS or FST)* via a **USB DIGITAL CONVERTER**.

APPENDIX B: JDSU CLEANBLAST® SYSTEMS

JDSU's **CLEANBLAST®** system is an advanced fiber cleaning instrument that provides a fast, effective, repeatable and cost-effective ***(less cost per clean than conventional cleaning methods at under $0.01 per clean)*** solution for removing loose dirt and debris from optical connectors. It utilizes a highly filtered stream of pressurized gas to create a high flow rate jet consisting of specially formulated cleaning solvent that blasts across the surface of the fiber, with nearly 100% effectiveness. Precision cleaning tips and adapters are also available for multiple configurations and connector types, allowing users to optimize their cleaning efficiency and performance. The CleanBlast® system also includes an input for an optional probe microscope, as well as a video output that can be connected to an external monitor or to a mounted LCD.

PORTABLE CLEANBLAST®

BENCH-TOP CLEANBLAST®

FEATURES & BENEFITS

- Provides rapid, controlled, and repeatable cleaning & removal of contamination from fiber end faces
- Utilizes a precise non-contact "air-solvent-air" combination to blast, remove and dissolve contamination
- Faster, more effective, and less cost per clean than other conventional cleaning methods
- Precision cleaning tips & adapters available to clean various types of "male" and "female" fiber connectors, including SC, FC, LC, ST, E2000, MPO, MPX, MT, MTP®, transceivers, etc.
- Inputs for optional video probe microscope and LCD display for fiber inspection
- Multiple system configurations for different applications

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